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SCIENCE NEWS LETTER

®

THE WEEKLY SUMMARY OF CURRENT SCIENCE

Busy Bee

See Page 138

A SCIENCE SERVICE PUBLICATION

WARREN A. MARRISON. Tompion Gold Medal, Worshipful Company of Clockmakers of the City of London, for pioneer work on development of quartz crystal oscillators as precision standards of time.

AXEL G. JENSEN. David Sarnoff Gold Medal, Society of Motion Picture and Television Engineers, for Television Research; G. A. Hagemann Gold Medal for Industrial Research, Royal Technical College, Copenhagen.

H. T. FRIIS. Medal of Honor, Institute of Radio Engineers, and Valdemar Poulsen Gold Medal, Danish Academy of Technical Sciences; important work in application of short and ultra-short radio waves.

CLAUDE E. SHANNON. Stuart Ballantine Medal, Franklin Institute of the State of Pennsylvania, for contributions to a comprehensive theory of communication.

W. G. PFANN. Mathewson Gold Medal, American Institute of Mining and Metallurgical Engineers, for discovery of and pioneering research in zone melting.

H. F. DODGE. Shewhart Medal, American Society for Quality Control, for original contributions to the art of statistical quality control.

R. KOMPFNER. Duddell Medal, Physical Society of England, for his original work on the traveling wave tube.

These are some of our recent medal winners at Bell Laboratories. The awards they have won symbolize recognition for outstanding achievement in the many sciences that bear on telephony. Bell Labs is extremely proud of them—and of the thousands of scientists and engineers who work with them to keep the American telephone system the greatest in the world.

WALTER H. BRATTAIN. Co-winner with Dr. John Bardeen of John Scott Medals, City of Philadelphia, for invention of the transistor.

BELL TELEPHONE LABORATORIES

WORLD CENTER OF COMMUNICATIONS RESEARCH AND DEVELOPMENT

ASTRONOMY

Destruction of Anti-Matter

Clashes of matter with anti-matter, annihilating both, might be cause of radio waves broadcast by heavenly sources, two astronomers speculate.

➤ CLASHES of matter with anti-matter destroying both, could cause the broadcasting of radio waves from space picked up on earth by the giant antennas called radio telescopes.

This speculation on the origin of some of the mysterious signals from the depths of the universe was presented to the American Astronomical Society meeting in Berkeley by Dr. G. R. Burbidge of Mt. Wilson and Palomar Observatories, Pasadena, Calif., and Prof. Fred Hoyle of St. John's College, Cambridge, England, who has been working in Pasadena.

The Burbidge-Hoyle paper was read by D. E. Osterbrock, also of Mt. Wilson and Palomar, since the scientists are in Europe.

Discovery of the anti-proton last fall strengthens suggestions that matter is symmetrical, or evenly matched; that for every fundamental particle of positive matter, there exists a negatively charged counterpart, such as anti-protons and positrons.

Investigating the possibility of anti-stars and anti-galaxies, Drs. Burbidge and Hoyle find that the most anti-matter that could be present in the Milky Way galaxy is one part in 10,000,000.

They calculated this from the known motions of the interstellar gas clouds in the Milky Way, the giant cluster of billions of stars of which the sun, with its planets including earth, are a part.

Assuming that this one part in 10,000,000 of anti-matter does exist, Drs. Burbidge and Hoyle find that its annihilation when colliding with normal matter provides an energy supply for the known sources of radio waves in the Milky Way.

The current theory concerning radio waves from cosmical sources holds that large fluxes, or streams, of electrons and positrons, such as would be created in the destruction of matter and anti-matter, moving in interstellar magnetic fields, are responsible for the radio emission.

Drs. Burbidge and Hoyle conclude that, for a number of sources, both in the Milky Way and far-distant galaxies radiating as a whole, the intensities of radio waves received on earth can be quantitatively explained by their theory of the existence of anti-matter on a cosmic scale.

Present methods of optical astronomy, they say, would not show whether the material of the universe is distributed evenly between the positive and negative forms.

Although any anti-matter formed at the creation of the universe "would have long ago disappeared," Drs. Burbidge and Hoyle suggest that anti-matter is being continuously formed in the vast, cold regions of interstellar and intergalactic space, at a rate equal to that at which normal matter is formed.

Under these conditions, a steady state is maintained. The addition of anti-atoms is balanced by their rate of annihilation, and the electrons produced by the destruction lose their energy by contributing to the random motions of interstellar clouds.

Radio astronomers may actually be hearing the hisses of one galaxy clashing with an anti-galaxy or a cloud of anti-gas when they train their radio telescopes on a strong source in the constellation of Cygnus, the swan. Although this speculation "borders on fantasy," if true, the reaction would stop itself when only about a ten-thousandth the mass of a typical galaxy had been annihilated. Pressure exerted by the electrons through the magnetic field they create, and also possibly by colliding atoms, would be sufficient to explode the colliding gases, thus slowing down and stopping the annihilation.

"The presence of anti-matter on a large scale cannot be ruled out as a cosmological speculation," Drs. Burbidge and Hoyle agree. Even the electrons resulting from the annihilation, they pointed out, would probably remain unobservable under the conditions occurring in the space between galaxies.

Science News Letter, September 1, 1956

TECHNOLOGY

Details Revealed on Powerful Sea Radar

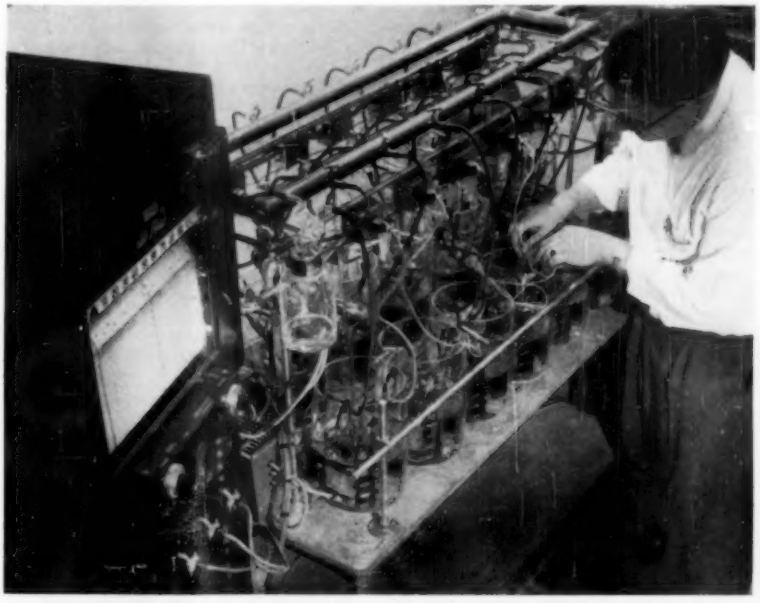
➤ THE MOST POWERFUL RADAR set afloat spots planes 400 miles away. The shipborne "seeing eye" is installed aboard the cruiser Northampton.

Heart of the set is an electronic tube known as a magnetron, nicknamed "Big Maggie." At peak power, the tube delivers over 10,000,000 watts, or enough power to take care of the electrical needs of a city of 25,000 people.

The tube's core is a cathode that operates at temperatures up to 3,100 degrees Fahrenheit, or hotter than molten iron. Development of the tube also resulted in breaking through the "sparking barrier," pushing it to a level ten times higher than previously.

The radar set was designed and developed by engineers at Westinghouse Electric Corporation, Elmira, N. Y.

Science News Letter, September 1, 1956



ELECTRICITY FROM GASES—The fuel cell is a device to obtain electricity from gases such as oxygen and hydrogen, which serve as positive and negative "poles," respectively. Here Dr. John Yeager at the research laboratories of National Carbon Company in Parma, Ohio, a division of Union Carbide and Carbon Corporation, is testing the oxygen, or positive, side of an array of these new and still experimental batteries. One of the aims of the research program is the development of improved fuel-cell carbon elements to last for long periods under relatively high and intense currents.

ENTOMOLOGY

Hit Flies With Poison Bait

Poisoned cornmeal or sweet syrups can be used to eliminate flies. However, sanitary measures to clean up the pests' breeding places is still only sound basis for fly control.

➤ THE MODERN WAY to handle flies when they get too obstreperous and plentiful is to feed them cornmeal—poisoned.

Poisoned bait and residual sprays between them have made the fly swatter almost as obsolete as the buggy whip.

Of course, fly control in the home and on the farm begins, as it always has, with sanitary measures to eliminate fly breeding places. This means keeping garbage and other refuse under cover and disposing of garbage frequently. It also means, on the farm, proper disposal of manure.

Screens on windows and doors are another aid in fly control.

In spite of all these measures, however, flies do get around, creating not merely a nuisance but a health danger as well. They can spread typhoid fever, dysentery and diarrhea, to mention just a few diseases that have been traced to flies.

However, the fly is not the trouble it used to be, thanks to modern insecticides and modern ways of using them, such as the poisoned baits and the residual sprays.

Poisoned baits have given "spectacular" results, controlling flies in some situations where sprays fail. Luckily, no resistance to the poison in the baits has yet developed, so the poisoned baits work equally well against resistant and non-resistant flies.

Black-strap molasses, cane or corn syrup and sugar may be used for bait as well as cornmeal. The cornmeal does not decompose as fast as the sweet baits. Over a million pounds of cornmeal was used last summer in poison baiting of flies.

Generally speaking, the one that is most readily available and cheapest in a given locality is the one to use.

For poison, malathion has proved very effective in baits. This is an organic-phosphorus insecticide. Two other effective poisons for the baits are diazinon and one known as L 13/59. These also are phosphorus insecticides.

Malathion and diazinon are also in the residual sprays, which are reported giving good results in some parts of the country.

Residual sprays are also known as surface sprays. Their effect lasts several weeks because flies are killed whenever they come in contact with the residue on the sprayed surface. These sprays are used on garbage cans, screens, porches, door and window frames, edges of arches and other places where flies gather.

For use inside the home, a space spray is easier. These are the kind that release a mist from a hand sprayer or an aerosol bomb. The insecticides in them may be DDT, methoxychlor, lindane, pyrethrins, and the synergists such as piperonyl butoxide, n-propyl isome and sesame oil. The synergists are important because they increase the effectiveness of the pyrethrins.

The U. S. Department of Agriculture has two leaflets giving details on making and using poisoned baits and sprays for fly control. They are Leaflet No. 390, available from the Government Printing Office, Washington 25, D. C., for five cents, and EC-29, Fly Control With Poisoned Bait, free from the Department of Agriculture, Washington 25, D. C.

Science News Letter, September 1, 1956

NUTRITION

Create "Reference Man" For Figuring Calories

➤ A "REFERENCE MAN" and a "reference woman" have been created by Food and Agriculture Organization scientists.

Creation of this hypothetical couple is intended to help nutritionists in countries throughout the world estimate calorie needs for flesh and blood men and women.

The man is 25 years old, free from disease and physically fit for active work. He weighs 143 pounds, lives in a mean annual temperature of 50 degrees Fahrenheit, consumes an adequate, well-balanced diet and neither gains nor loses weight.

He works an eight-hour day at a job that, although not sedentary, does not involve more than occasional periods of hard physical labor. When not at work, he is sedentary for about four hours and may walk for up to one and one-half hours. He spends about an hour and a half at active recreation and "household work," says FAO. His food needs on an average for the entire year are assumed to be 3,200 calories daily.

His female counterpart is also 25 years old. She weighs 121 pounds, lives in the same environment and may be engaged in general household activities or light industry.

Her daily activities include walking about three miles a day and one hour of active recreation such as gardening, playing with children or non-strenuous sport. Her average daily food consumption over a year is assumed to be about 2,300 calories.

If she is nursing a baby, she may need an extra 800 to 1,000 calories per day for six months. Increased calorie requirements when expecting a baby are estimated at 40,000 per pregnancy.

This is the second reference man and woman created by FAO. The first were created in 1950. Since then, new knowledge has required revision of the figures.

The studies deal with calorie requirements, not with desirable composition of diets. A diet may meet the calorie requirements without being satisfactory for good health and nutrition.

FAO also points out that race of itself does not influence calorie requirements. On this its report states: "As far as present knowledge goes, individuals of the same size living in the same environment and having the same mode of living will have the same calorie requirements whatever their race."

Science News Letter, September 1, 1956

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TECHNOLOGY

Very Accurate Measuring

Practical equipment for comparing lengths to the nearest ten-millionth of an inch, developed at National Bureau of Standards, will be used to check industry's master gage blocks.

➤ DIFFERENCES of only a ten-millionth of an inch, or about one-thousandth the thickness of a human hair, can be accurately measured using an instrument developed by the National Bureau of Standards.

The device uses light waves as "measuring sticks" to determine the difference in length of two gage blocks, which are precision measuring instruments.

Practical equipment for comparing lengths to the nearest ten-millionth of an inch has been greatly needed because of the extremely small tolerences required for parts used in guided missiles, jet aircraft, machine tools and other precision instruments.

Theodore R. Young and James B. Saunders designed the device to check the length of industry's master gage blocks, which control the tolerances of mass-produced machine parts. It was exhibited to industry representatives at a Conference on Gage Block Research in Washington. Regular appropriated funds for its development were supplemented by grants from ten manufacturers.

Dr. Allen V. Astin, the Bureau's director, said the program's objectives were to develop instruments and methods to enable the Bureau to certify master gage blocks to the nearest ten-millionth of an inch, and to develop more stable alloys for gage blocks so that measured length will remain more nearly the same.

A gage block is a rectangular block of a hard metal, usually steel, whose opposite faces are precisely ground and polished so they are parallel and a given distance apart.

Mass production of mechanical parts depends on the accuracy of the calipers and micrometers used in the shop. These instruments are checked by the manufacturing company against its master gage blocks, which in turn are periodically submitted to the National Bureau of Standards for checking against standard gage blocks. The Bureau's blocks are linked back to the national standard of length, the platinum-iridium meter bar, which is kept in a vault.

Master gage blocks are now certified to an accuracy of the nearest millionth of an inch for inch-long blocks.

To the manufacturer of machines and tools, a set of precision gage blocks in various sizes is as indispensable as are the square and rule to the carpenter or measuring tape to the surveyor. Without accurately calibrated gage blocks, mass production of interchangeable parts, such as automotive cylinders and pistons, would not be possible.

Dr. Astin said a major problem yet to be solved is the development of means for the "absolute" measurement, to the nearest ten-millionth of an inch, of the primary standard gage blocks with which the Bureau compares industry's master gage blocks.

The absolute measurement will involve comparing the entire length of the gage block with light wavelengths. This measurement will be much more difficult than comparison of two gage blocks.

For one thing, a much longer distance must be compared with light waves. Also, extremely accurate control of temperature, air pressure, and other conditions will be necessary.

As mechanized industry becomes steadily more complex, the tolerances that can be permitted in machine parts is continually decreasing.

Manufacturing firms supporting the Bureau's gage block research program are E. I. duPont de Nemours & Co., Greenfield Tap and Die Corporation, Hughes Aircraft Co., the Taft-Peirce Manufacturing Co., the Timken Roller Bearing Co., the Van Keuren Co., the Sheffield Corporation, the DoAll Co., Dearborn Gage Co., and Pratt and Whitney Division of Niles-Bement-Pond Co.

Science News Letter, September 1, 1956

PRECISE DEVICE — This accurate measuring instrument was developed at the National Bureau of Standards for comparing lengths of gage blocks to the nearest ten-millionth of an inch. Theodore R. Young, one of the scientists who designed the device, is shown demonstrating its use.

RADIO

Saturday, September 8, 1956, 1:45-2:00 p.m. EDT

"Adventures in Science" with Watson Davis, director of Science Service, over CBS Radio Network. Check your local CBS station.

Dr. Armand Spitz, director of Spitz Laboratories and inventor of the Spitz Planetarium, coordinator of Visual Satellite Observations of the Smithsonian Astrophysical Observatory, will discuss "Seeing Satellites."

MANPOWER

Rare Trumpeter Swans Dyed Yellow in Oregon

➤ SIX TRUMPETER SWANS have been dyed yellow so their dispersion pattern may be traced if they leave the Malheur Waterfowl Refuge, Burns, Oreg.

The trumpeter, biggest of our North American waterfowl, was near extinction 20 years ago. At that time only 73 of the big birds could be counted. With careful watching, the trumpeter flock has grown to over 600, according to the U. S. Fish and Wildlife Service.

The yellow dye is part of the control program. Observers have reported the low-flying swans, with their six-foot wing spread, migrating between nesting areas in the United States and Canada.

Science News Letter, September 1, 1956

ENTOMOLOGY

Mosquitoes Resist DDT With Same Enzyme as Fly

➤ MOSQUITOES resist DDT with the same enzyme that house flies use to detoxify the insecticide.

Large amounts of DDT dehydrochlorinase, commonly called DDE, have been found in mosquitoes from Florida and Spain, two scientists report in *Nature* (Aug. 18).

The two groups of mosquitoes, both DDT-resistant, were compared with non-resistant mosquitoes from other areas. The non-resistant strains produced insignificant amounts of DDE, but the resistant insects produced enough of the enzyme to enable them to counteract DDT.

Each larva of resistant yellow fever mosquitoes produced an average of about one-fourth as much DDE as an average resistant house fly, which weighs about four times as much.

Further research showed that mosquitoes produce the enzyme under different conditions than house flies. Additional study is expected to reveal the nature of these conditions.

The investigation was carried out by Dr. A. W. A. Brown of the University of Western Ontario, London, Ontario, and A. S. Perry of the U. S. Public Health Service Technical Development Laboratories in Savannah, Ga.

Results of their studies are being made available in a report to the World Health Organization.

Science News Letter, September 1, 1956

PUBLIC HEALTH

Non-Prescription Sales

Proposal of the Food and Drug Administration to sell some hydrocortisone compounds over-the-counter is being opposed by physicians and pharmacists.

➤ PHYSICIANS and pharmacists are currently fighting a Food and Drug Administration proposal to allow over-the-counter sale of hydrocortisone ointments and lotions for skin troubles.

However, manufacturers of the drugs, who started the fight, now seem to be holding back and pulling their punches. The Food and Drug Administration consequently is left holding the bag, since it must decide whether or not a drug that will relieve itching and smarting skin in some cases can be bought at drug stores, supermarkets and other places where non-prescription drug items are sold.

Some of the hydrocortisone skin medicine manufacturers started the fight by petitioning the Food and Drug Administration to allow over-the-counter-sale.

First of the manufacturers to do this was the Upjohn Company of Kalamazoo, Mich. Others rapidly followed suit. Then FDA in January, 1956, issued a proposal for this, to take effect after a number of months from the announcement of the proposal.

Subsequently, skin specialists all over the country began writing to FDA opposing this idea. Their arguments are that hydrocortisone, famous as an anti-arthritis and anti-inflammation remedy, is a powerful drug which can be dangerous; that the layman cannot know whether his skin trouble is minor and may safely be treated by himself; that hydrocortisone does not help all skin conditions and may make some worse, particularly when the skin is infected as well as irritated.

Druggists joined the fight, pointing out among other things that the layman too often fails to read or heed warnings on drug labels and that if a drug is sold over-the-counter, it may be sold in stores where there is no professional pharmacist to warn the buyer of possible dangers and to urge him to follow directions on the label.

With a controversy on its hands, FDA called public hearings so that arguments on both sides could be given and evaluated.

The drug manufacturers, meanwhile, began to hold back. They did not want a fight with the doctors and pharmacists. At the hearings, they limited their testimony to facts in their records and published medical reports. They did not give arguments in favor of the measure they originally had requested.

The situation was even more complicated by reports of studies showing hydrocortisone in the ointments and lotions was absorbed through the skin in fair quantities. These reports were not available at the time the manufacturers petitioned FDA for over-the-counter sales.

One of them was from Dr. Clarence Livingood of Detroit. His studies had been supported in part by the Upjohn Company, which also ran some of the analyses for him. Upjohn did not make him feel obligated to modify his report and the findings may in fact have changed the company's own view about over-the-counter sale.

Another surprise came in a report at the hearings that 98 skin specialists in New York who had used the drugs in treating some 90,000 patients over a period of four years did not see any adverse effects of the drug. Not all the 98 favored over-the-counter sale of the drugs, although they considered it safe with proper label precautions.

This contrasted with a report of a drug company questionnaire answered by 1,600 of 2,100 leading skin specialists throughout the nation. Of the 1,600, only 45 were in favor of over-the-counter sale for the drugs.

Final decision is up to the Food and Drug Administration which now must take a stand on the rather tangled controversy.

Science News Letter, September 1, 1956

MARINE BIOLOGY

Census Being Taken of World's Marine Life

➤ A CENSUS of the world's underwater populations is now underway by the Food and Agriculture Organization of the United Nations.

The world-wide marine survey may determine the future of fisheries' industries around the globe. Marine biologists said results of the survey can mean:

Greatly increasing the harvest of seaweed.

New uses for such intermediate links in the marine food chain as zooplankton.

Discovery of the nature and extent of stocks in relatively unexploited grounds, as well as new grounds.

Commercial uses of trash fish or species not now considered to be of any value.

The current annual world catch of fish, crustaceans and mollusks is put at about 27,000,000 metric tons. This, fishery experts pointed out, could be boosted to some 50,000,000 metric tons in the next 20 years.

An FAO expert in Rome reported that only ten percent of man's present animal protein food comes from the waters of the world.

"Fisheries," he said, "are still in a primitive state as compared with, say farming. The ultimate aim in fisheries is to conduct the industry with the same efficiency and certainty which now exists in agriculture, although, of course, we can never hope to 'farm,' as it were, all the oceans and seas. But we need to practice fish husbandry to the fullest extent within the limits possible."

The FAO in Rome is acting as the clearing house and the prime mover for the undersea life census, which is expected to take many years to complete.

Science News Letter, September 1, 1956

TECHNOLOGY

Waste Coal Salvaged With Cleaning Process

➤ TESTS of a cleaning technique used on raw coal show the method can be used to extract coal from waste materials, saving thousands of dollars for the coal industry, the U. S. Bureau of Mines has reported.

Using the process, technicians in Washington State and Alaska are salvaging hundreds of tons of waste coal for market. A coal company in Roslyn, Wash., encouraged by test results at the Bureau of Mines' pilot plant in Seattle, is recovering more than $3,000 worth of marketable coal every month from washery refuse.

The technique, called the dense-medium process, uses a suspension of fine particles of magnetite or other heavy solids in water to separate valuable bits of coal from dirt, rock and shale. Heavy wastes sink to the bottom of a separating bath, while the lighter pieces of coal float at the top.

The Bureau of Mines tests at its Northwest Experiment Station in Seattle give the first detailed data on the technique's performance on waste materials. The dense-medium process has been used for several years to clean raw coal as it comes from the mines.

Chief purpose of the tests was to discover whether dense-medium cleaning could cut mounting coal losses at preparation plants, Bureau scientists said.

Science News Letter, September 1, 1956

OCEANOGRAPHY

Research Ship to Study Sea-Air Bondary

➤ A SCIENTIFIC LOOK at the sea and the air above it will be the mission of the New York University research schooner Action commissioned on Aug. 22.

The 65-foot, two-masted craft will first be used to measure the exchange of energy between the atmosphere and the ocean's surface. Interaction at the air-sea boundary is important in weather forcasting.

Tiny ocean waves will be investigated to determine how they reflect radar signals and reduce the usefulness of radar for navigation purposes.

The oceanographic schooner Action will later study tides and currents in the New York area, relating the findings to water pollution, bathing areas, shellfish and erosion of coastal areas.

The Action has a wide cruising radius and its construction makes it exceptionally stable while observations are being made.

Science News Letter, September 1, 1956

MOUNTAIN MEASURING—Jack Lyon and Toivo J. Nelson (left to right), U. S. Geological Survey engineers, sight on ice-clad Mount Rainier while a Bell Aircraft Corporation helicopter flies by. The helicopter, piloted by William Quinlan of Bell, carried two engineers and nearly 200 pounds of instruments and equipment to the top of the 14,410-foot summit to assist the survey project.

GEOGRAPHY

Mount Rainier Measured

➤ MOUNT RAINIER is only two feet higher than previously recorded.

The new official altitude for the northwestern volcanic cone is 14,410 feet above sea level, a measurement just made by scientists of the U. S. Geological Survey. The previously accepted height of 14,408 feet was found by the Survey in 1913.

In June, 1955, a final resurvey of Mount Harvard in Colorado showed that it was actually 21 feet higher than had been recorded. At that time, Mount Rainier was listed as the fourth highest mountain in continental United States. However, with Mount Harvard recorded at the new height of 14,420 feet, it became the third highest and 14,418-foot Mount Massive, also in Colorado, dropped to fourth, dropping Mount Rainier to fifth.

Mount Whitney in Sequoia National Park, California, at 14,495 is the highest, and 14,431-foot Mount Elbert in Colorado, second highest.

A helicopter, Bell Model 47-G-2, supplied by the manufacturer, transported a crew of four men to the summit of the mountain from the vicinity of Paradise Valley. It has a higher ceiling than earlier helicopters.

Surveying was done by triangulating from three points already accurately located in the area north of the mountain: Spar Tree, O'Farrell Lookout and Sun Top Lookout.

Work on the crest of the mountain was directed by Charles R. Lloyd and Toivo J. Nelson, veteran geodetic engineers of the Geological Survey.

They were assisted by photographer William Kirscher of the Survey, and William J. Butler, assistant chief ranger of the National Park Service. The pilot was William Quinlan of Bell Aircraft Corporation. Preston Macy, superintendent, Mount Rainier National Park, and Robert O. Davis, region engineer, Geological Survey, were in general charge.

Prior to the 1913 survey that set the elevation at 14,408 feet, the height of the summit had been determined no less than three times.

S. S. Gannett of the Geological Survey determined the altitude by angulation from the Cascades in 1895 as 14,532 feet. G. E. Hyde of the Geological Survey took about 40 angles from various points in the Cascades to the northeast with distances averaging about 25 miles. The altitude determined was 14,519 feet.

The U.S. Coast and Geodetic Survey determined the height by angulation from the west at long distances and obtained an altitude of 14,440 feet. The average of these elevations, 14,490 feet, is considerably above the newly measured elevation.

Science News Letter, September 1, 1956

PSYCHOLOGY

Meaning of Wound Determines Its Pain

➤ HOW MUCH a wound hurts depends a lot on its meaning to the victim.

War wounds are likely to hurt much less than the "surgical wounds" of civilian patients after operations, although the war wounds may be more extensive and serious.

The reason: The men wounded in war see their wounds as "good fortune" because they are the means of deliverance from an area of "desperate anxiety." Civilians, on the other hand, see their surgical operations as "depressing, calamitous events."

This explanation of the difference in the hurt of war wounds and civilian surgical wounds is reported by Dr. Henry K. Beecher of Harvard Medical School in the *Journal of the American Medical Association* (Aug. 25).

It is based on two surveys, one among 150 men wounded at the Anzio beachhead during World War II and the other among 150 civilians undergoing various types of surgery.

Among the war wounded only 32% wanted a pain reliever a few hours after the injury, while 83% of the surgical patients did.

Not all injured persons need to be given pain-killing drugs, it appears from these findings. A considerable number, Dr. Beecher said, may be helped simply by "alterations of mood," such as relief of anxiety.

The findings also suggest that experiments in testing pain-killing drugs may be limited in usefulness, since experimental pain carries with it little anxiety.

Science News Letter, September 1, 1956

AGRICULTURE

Time and Energy Studies Increase Farm Efficiency

➤ TIME AND ENERGY studies now being made on farms are the newest approach to the problems of farm efficiency.

The studies resemble time and motion studies in industry. The results show what methods are easier on the laborer and the difference in effort between the various ways of doing jobs.

For instance, a time and motion study of tobacco priming shows that the present accepted rate of priming, 130 leaves per minute, can easily be surpassed, but an energy analysis of the same task shows that efficiency quickly decreases when operational speeds are above this level.

Energy output can be measured by the performance of certain body functions, such as the rate of heartbeat.

The advantages of time and energy studies on farms were described by two North Carolina State College researchers, C. W. Suggs and W. E. Splinter, speaking at a meeting of the American Society of Agricultural Engineers in Roanoke, Va.

Science News Letter, September 1, 1956

MEDICINE

Outline Seven-Point Anti-Arthritis Program

➤ A SEVEN-POINT program for lessening the chances of coming down with arthritis has been drawn up by the Arthritis and Rheumatism Foundation.

The program is for farmers, who are attacked by arthritis more than people in any other line of work. Here are the seven points:

1. Do not overdo more than you absolutely must.
2. Get sufficient rest.
3. Stop for a breather several times during the day.
4. Prevent wear and tear on the muscles by warming up before a day of strenuous activity. Simple setting up exercises will do.
5. Start the day with the lightest chores.
6. Try to overcome worry and unpleasant situations.
7. Do not forget regular medical checkups.

The aches and pains of arthritis afflict almost a fourth, 23%, of American farmers, the arthritis foundation has found. Why this disease attacks so many farmers is not known. Exposure to the elements may have something to do with it.

Hard physical labor over the years without let-up and lack of relaxation may also be involved. Fatigue and worry are two of the greatest contributing causes of arthritis.

No cure for arthritis exists. Numerous drugs to help almost every sufferer are available, however. In 70% of the cases of rheumatoid arthritis, which is the most destructive form of the disease, crippling can be prevented if treatment is started early enough. So, while not every ache or pain means arthritis, persons with the following symptoms are urged to see their doctors:

Persistent morning stiffness, pain and swelling of the joints, persistent muscle aches and pains, unexplained weight loss, fever and weakness, and undue warmth of a painful joint.

Science News Letter, September 1, 1956

TECHNOLOGY

Computer Makes Coal Mines Safer

➤ TWO YEARS' EXPERIENCE with a computer that solves mine ventilation problems have proved the device can improve coal mine ventilation systems and save large mining concerns time and money, G. E. McElroy, chief of the Bureau of Mines ventilation section, Pittsburgh, said.

The machine, an electrical network analogue computer, can figure out just how a proposed change in a system of ventilation will really work.

In each of the six mines for which the computer has been used, it has eliminated the need for costly trial-and-error procedures. The $18,000 instrument kept one mine owner from spending $30,000 on a proposed change of main fans by proving the change would not produce the desired results.

Mr. McElroy said the computer can detect weak points in ventilation systems, thereby encouraging mine operators to improve them before serious trouble develops.

Coal mines, which have extensive networks of passageways, frequently require complex ventilation systems to remove explosion-producing methane gas and give the miners fresh air. Ordinary mathematical methods of working out effective systems have been considered too cumbersome and tedious to be practical.

Most mine operators have had to be content with trial-and-error methods, trying out alternative systems until a seemingly effective one was found.

Now, however, mine operators can learn in advance just how well any proposed system will work.

The computer was developed by Prof. Malcolm S. McIlroy, former head of electrical engineering at Cornell University.

Science News Letter, September 1, 1956

HORTICULTURE

Thornless Blackberries Bred for East Coast

➤ THORNLESS BLACKBERRIES that will grow hardily east of the Rockies are being developed by U.S. Department of Agriculture horticulturists. They should be ready in about five years for garden use.

Drs. D. H. Scott and G. M. Darrow, principal horticulturists, and D. P. Ink, biological aid, of the Plant Industry Station, Beltsville, Md., reported to the American Society for Horticultural Science meeting in Storrs, Conn., success in creating the first genetically thornless blackberries that give promise of growing successfully in the eastern and Midwest areas of the nation.

Breeding from the Merton Thornless variety that was discovered among seedlings in Britain, the American scientists crossed it in 1948 with existing kinds that grow successfully in American climate. In the second generation, one out of 35 seedlings proved to be thornless. These are now being propagated for more extensive growing tests with the hope that they will prove to be suitable for garden use.

Thornless blackberries developed on the Pacific coast have not been hardy enough for use in the rest of the country.

A new kind of grape, whose parents are the variety used in California, *Vitis vinifera,* and a resistant native grape of southern U.S., *Vitis rotundifolia,* was reported by Dr. Haig Dermen of the U.S. Department of Agriculture's Plant Industry Station, Beltsville, Md. The sterility that occurs in previous crosses was remedied by using colchicine for doubling the chromosome number, making what is called a colchiploid hybrid.

This grape of superior quality is now being propagated for testing and in about five years may be ready for introduction, if all goes well.

Science News Letter, September 1, 1956

IN SCIEN

MANPOWER

Warns of Trap in Competing With Russians

➤ IN SOLVING the problem of the shortage of scientists and engineers, the United States should be careful "not to be caught in the trap of trying to compete with the Russians," Dr. E. R. Piore, vice-president for research of AVCO Manufacturing Company, formerly chief scientist for the Office of Naval Research, has warned.

"Our first concern should be to understand what we are trying to do in the United States and then tailor our requirements in manpower to those needs," he urged.

The "greatest need," Dr. Piore told the 1956 National Telemetering Conference in Los Angeles, is "quality and breadth of training."

He suggested more use of upgrading less well-trained persons as one aid in the shortage problem. However, he said, there is still a need for "imaginative people" to lead the large group of existing engineers.

Dr. Piore also warned that, just because there are shortages of scientists and engineers, funds for science and technology should not be reduced. Doing so, he charged, "would wreck our industrial expansion and weapon development."

Science News Letter, September 1, 1956

HOME ECONOMICS

Moth Protector May Harm Clothes

➤ SOME PLASTIC HANGERS melt in a hot atmosphere, as in an attic in summer, when paradichlorobenzene, a popular moth preventive, gives off its vapors nearby.

Complaints from homemakers led the U. S. Department of Agriculture's Agricultural Research Service to find out why plastic hangers sometimes stick to clothes that have been hung away for summer storage.

Combination of the moth-repelling vapor and temperatures greater than 110 degrees Fahrenheit were found responsible for softening the plastic. At 80 degrees Fahrenheit the plastic would take months to soften in the chemical vapor, but at 130 degrees, a temperature not unusual in a hot attic, the investigators saw the plastic soften and soak into the garments in a few hours.

Paradichlorobenzene is placed in solid form near clothes to be protected from moths. It vaporizes without turning liquid. Many prefer it to "mothballs," which are made of naphthalene, because the odor is less persistent. Naphthalene, in the Department of Agriculture's study, does not have the softening effect.

Science News Letter, September 1, 1956

CE FIELDS

HORTICULTURE

Fast Breathing Banana May Aid Ripeness Test

➤ THE FASTER a banana breathes, the softer it is getting.

Scientists in London, determined to find a banana ripeness test, think they have found a possible clue to the puzzle. Up to now, they said, judgment of banana ripeness has depended on experience and a good eye.

However, ripening precedes any change in the fruit's color.

It has now been found, they reported to the Food Investigation Board in London, that the change in hardness follows fairly quickly after the increase of respiration.

"The discovery," they said, "will be followed up in an attempt to achieve a definite test of the condition of the fruit before it is shipped."

Science News Letter, September 1, 1956

NATURAL RESOURCES

National Park System Has 40th Anniversary

➤ THE NATION marked the 40th anniversary of the National Park Service with the start of one of the most important decades in National Park service history.

The reason: Mission 66.

Mission 66 is turning the attention of conservationists and Park Service officials from the 40th to the 50th anniversary. That is the date Mission 66, the biggest improvement program in Park Service history, will be completed.

By then roads in national parks will have been improved and housing facilities increased, although moved away from scenic areas, to accommodate one of the nation's fastest growing enterprises.

Since establishment of the National Park Service on Aug. 25, 1916, there has been an almost continuous increase in visitors to national parks, with the exception of the World War II years.

This is attributed partly to efforts of the Service's first director, Steven T. Mather, who did much to stimulate public consciousness of the National Park System during his 12 years in office from 1917 to 1929. Mr. Mather helped launch the park interpretive program that, with its museums and scientist-guides, has been an educational boon to tourists.

During Mr. Mather's administration, the Park System was largely confined to western United States. Under the Reorganization Act of 1933, President Roosevelt integrated into the system many monuments and reservations in the East and South that had been administered by the U.S. Forest Service and War Department. This made the Park System truly national.

During World War II, park attendance dropped from 21,000,000 persons annually to a low of 4,000,000 in 1943. Parks were practically stripped of personnel and many facilities could not be maintained.

However, attendance jumped back to its old level right after the war, and soon swelled under the influence of one of the greatest travel booms in history. It hit a peak of 50,000,000 last year.

During the past 11 years Federal park appropriations have been small, but the recently launched Mission 66 program, which anticipates a Federal expenditure of more than $17,000,000 on Yellowstone Park alone, should make up for this.

Science News Letter, September 1, 1956

NUTRITION

Government Agency Devises Sandwich

➤ A FISH SANDWICH has been devised by the Fish and Wildlife Service.

The home economists of the Service call their new development a "toasted tuna French loaf."

Here is the recipe:

1 can (6½ or 7 ounces) tuna
¼ cup butter or margarine
1 teaspoon prepared mustard
1 small loaf French bread
1 tablespoon grated onion
1 cup grated cheese
2 tablespoons chopped sweet pickle or sweet pickle relish.

Drain tuna. Flake. Cream butter and mustard. Cut bread in half lengthwise and remove a small amount of the center. Spread the bread with mustard-butter. Combine remaining ingredients. Fill bread with tuna mixture. Cut loaf into 12 slices and wrap in aluminum foil. Bake in a very hot oven, 450 degrees Fahrenheit, for 30 minutes or until heated through and cheese melts. Serves six.

Science News Letter, September 1, 1956

TECHNOLOGY

Giant "Brain" Becomes Signal Corps Supply Clerk

➤ SUPPLIES for the Army Signal Corps the world over will be managed by a giant electronic "brain" now in operation at the Army Signal Supply Agency, Philadelphia.

The electronic supply clerk collects and memorizes 8,000,000 different facts on more than 150,000 different electronic items required to keep the Army's global electronic-communication systems operating.

The computer can make 37,500 changes to these facts per day, uses the facts to process 6,000 orders for supplies received daily, and remembers all orders received when stocks are unavailable and fills the orders when stocks are received.

The computer was designed and built by the International Business Machines Corporation.

Science News Letter, September 1, 1956

TECHNOLOGY

Faster, Safer Sail Designed

➤ ONE of man's oldest methods of transportation has been revised and improved by a General Electric company engineer of Schenectady, N. Y.

A faster, safer sail for boats, designed by Burnice D. Bedford, a research engineer who holds 92 patents, has outperformed conventional sails in tests on upstate New York lakes.

The rectangular canvas is stretched across an H-shaped frame and suspended between two vertical bars.

Instead of swinging outward like a regular triangular sail, Mr. Bedford's sail swings upward from the bottom like a kite in a strong breeze.

This means that, instead of making a boat lean with the wind, Mr. Bedford's rig has a lifting action. A dinghy that could carry only 72 feet of conventional sail can carry 120 feet of canvas when it is on an H-shaped frame.

The sail can be placed at any angle to the wind without a change of course. A skipper can "spill" a heavy wind as much or as little as he wishes.

This reduces the over-turning movement characteristic of craft equipped with triangular sails.

In tests, the sail enabled a 12½ foot dinghy to keep pace with much larger boats. Mr. Bedford believes the rig can be adapted to any small or medium sized racing sailboat.

Science News Letter, September 1, 1956

NUTRITION

Fertility Increases During Starvation

➤ STARVING MALES are more fertile than well-fed ones.

Experiments showing that this is true for dogs are reported by Drs. Harry A. Teitelbaum and W. Horsley Gantt of Johns Hopkins University, Baltimore, in *Science* (Aug. 24).

"Although we are fully aware of the potential pitfalls involved in interpreting human behavior on the basis of data derived from other species, the sociological implications of our findings are evident," the scientists point out.

It may be, they suggest, that during the early period of starvation in human or other populations fertility increases as a "compensatory process" to maintain stability of the species.

Sperm counts, both total and per cubic centimeter, increased in four dogs during ten days of starvation. After the starvation period, the sperm counts dropped. Low sperm counts have been associated with subfertility in men.

The relationship between state of nutrition and fertility is quite controversial, the scientists state, pointing to conflicting reports in the past.

Science News Letter, September 1, 1956

GENERAL SCIENCE

Small Game Hunting

How would you like to go hunting where there are no limits, where game is always plentiful, and where all "kills" can be mounted? You can hunt with a camera in your back yard.

See Front Cover

By FREMONT DAVIS

➤ AS A HUNTER, I probably enjoy the best conditions in the business for plying my sport.

For me there are no limits, no seasons, no worry about the game being too small, no sweat as to whether the prey I am stalking is male or female, game is always plentiful and when I do bag something, it can be mounted with little or no trouble every time.

Sound interesting? Well it is. It is small game hunting with a camera. And by small game hunting I mean anything from the enormous size of a kitten to the tiny soldier ant lugging the day's harvest back to camp.

For Americans, stalking birds and bees with a camera is a relatively new dimension to a very popular and old hobby. But its fascination cannot be denied, for it takes all the cunning, skill and preparation that big game hunters need on an African safari.

Basically, there are many similarities between the much publicized and glamorous big game hunting and its poor man's counterpart, small game hunting with a camera.

Equipment Can Vary

The equipment, for instance, can be as primitive as the African native's spear, or as extensive and expensive as one can afford. Chances for more and better kills are afforded with highly accurate equipment, however. By the same token, the hunting technique itself is virtually the same. Game must be stalked, movement kept to a minimum and, at times, almost impossible positions must be assumed by the hunter to bag his quarry.

Calmness, patience, accuracy and steadiness are as much a part of the sport of small game hunting as they are of high-powered big game doings.

There are several methods of hunting with the camera, depending on the type of camera used and the types of game to be hunted.

For purposes of hobbying, I have kept the use of equipment down to a minimum. A single lens reflex camera with extension tubes has proved adequate for close-up shots of bumblebees, dragonflies, water skaters, etc.

The lens is a two-inch high-speed lens of the type found in most 35 mm cameras. The camera itself is a Rectaflex with a 50 mm f/1.8 Angenieux lens. Although other cameras will serve the purpose of small game hunting, the single lens reflex camera offers the advantage of permitting the photographer to examine the image that will make his picture up to a fraction of a second before the shutter release is squeezed.

With small quarry, I have found, the trick is to get the picture arranged so that it is interesting and at the same time tells a story. As much as possible the quarry should be parallel to the film to reduce the depth.

You do this because of technical considerations. You must get so close to your subject the chances are that you will be working at the limit of the ability of the lens to resolve detail. The distance from the front of the area in your picture that is sharp to where it gets fuzzy in the background is so small it may not cover the thickness of the insect.

To keep this depth, you should close the lens down as far as you can. This means that even if you have an f/1.8 lens, use the lens setting f/11 or better yet f/16 or f/22. In effect, what you have done is to increase the depth of focus by decreasing the lens opening.

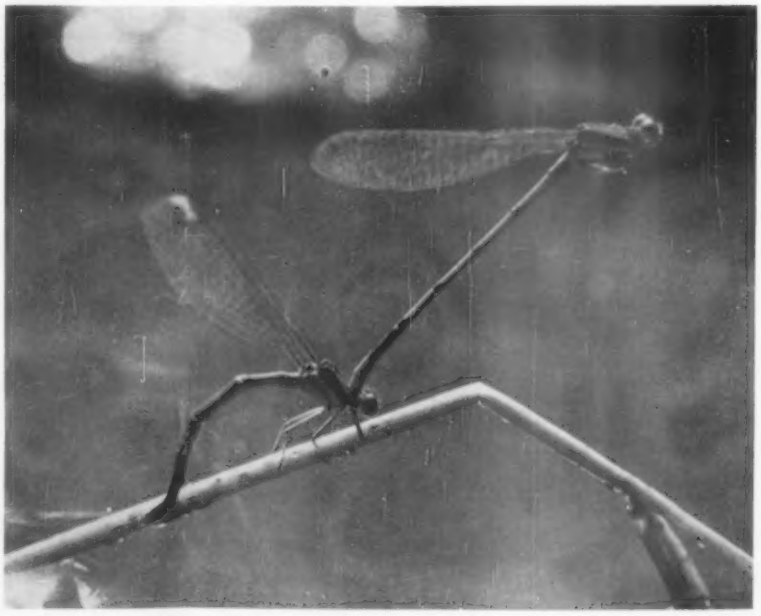
The bumblebee shown on the cover of this week's SCIENCE NEWS LETTER was "shot" while in the midst of winning the day's bread. I bagged him at 1/100th of a second at f/16 with a Rectaflex, using a two-inch extension tube on my camera to give a four-inch distance between the lens and the film. This makes the subject on the film equal in size to the original.

This in no way solves all the problems, however, For the more you close down the diaphragm in the lens, the longer the shutter speed must be to get enough light into the camera for the proper exposure.

Movement Is Problem

The longer the exposure, 1/25th of a second for instance, the more chance of movement during the taking of the picture. This is why steady hands and a comfortable position is so important to the small game photographer-hunter. Movement is much more apparent in close-up photography than it is when you take a picture of the family.

For free hand, natural game hunting, I use the fastest film I have, Tri-X. This permits me to shoot at about 1/100 of a second with the lens set at f/16 on well-



OUT ON A LIMB — These mating Damsel-flies are part of a day's "bag" for Fremont Davis, Science Service Staff Photographer, who "shoots" small game in his own back yard and mounts them in his trophy book. These insects were "caught" at one-fiftieth of a second at f/16 with a Rectaflex.

MR. SPIDER—This harum-scarum looking fisher spider was snared on film by Fremont Davis, Science Service Staff Photographer, to illustrate how small game hunting with a camera can be exciting. The spider was "caught" at one-fiftieth of a second at f/16 with a Rectaflex.

lighted subjects.

This, obviously, is the simplest method of small game hunting with a camera. Therefore, it is advisable to take several pictures of any one good subject for the chances of a perfect shot are not as high as they could be. The insect may very well disregard your breathless cry of "Hold it"

Poor focus and movement take their toll of negatives.

But taking pictures is not the only fascinating part of small game hunting. Equally as important is the world in which you do the hunting. A world very much alive that suddenly unfolds before your eyes as well as the camera eye. There is bound to be a surprise each time you look at the animals and insects and their habits and ways.

No Need to Nature-Fake

The real actions of the insect world are so exciting there is no need to nature-fake. Be a good hunter. Shoot only from natural life and disregard posing and other tricks.

Although using tricks is against the code of the best small game camera hunters, there is a legitimate and very much accepted way of making the game hunting a little easier.

Just as big game hunters use larger and better weapons to be more effective, so can the camera fan use similar equipment in his own arsenal to get better pictures.

The big problem of getting a fast exposure to cut down on the motion factor and, at the same time, permit enough light to fall on the film to make the picture with a small lens opening, can be solved. The secret is the use of the high-speed electronic flash now so widely used. This allows an exposure of about one-thousandth of a second duration with the lens open to a very small aperture.

You will still have to crawl on your hands and knees and take the same great care with the camera, but the average of good negatives in your game bag will increase.

Still better pictures can be had with a lens that will show the detail better. These are the photomacrographic lenses such as the microtessars. They are specifically designed for use at short distances, such as we have been discussing.

Color photographs are not much more difficult to take in small game hunting than are black and white. The lens opening in most cases will have to be larger but the vivid colors will make the results much more exciting.

The only way to get the proper exposure for each picture is to make some test shots. You must "sight in" your equipment in much the same manner big game hunters calibrate their rifles for accuracy.

Other tricks in stalking and shooting will come naturally. As an example of what I mean, I found that it was more comfortable to float around the edge of a pool in a rubber tube and in a bathing suit. This permitted me to rest my elbows for steadiness. And it was cool.

Science News Letter, September 1, 1956

NUTRITION

Secrets of Making Tasty French Fries

➤ IF FRENCH FRIES turn out grease-soaked, dark-brown and scorched-tasting, it could be they originally had a low specific gravity, U. S. Department of Agriculture experts report.

Tests with potatoes from Maine to Washington show that just about everything from fat to field has an effect on the final French fry, but one of the most important factors is the potato's specific gravity.

Potatoes of high specific gravity, those that are heaviest for their size, make the best French fries.

Other factors the USDA scientists found that play a part in making tasty, crisp and golden-brown French fries are:

1. Storage temperature, recommended at 50, 55 and 60 degrees Fahrenheit to retard sugar accumulation.
2. Quick washing of pared or sliced potatoes rather than a ten-minute soaking to remove surface starch.
3. An eight-to-one weight ratio of fat to cut pototoes.
4. Par-frying at 360 degrees Fahrenheit and finishing off at 375 degrees Fahrenheit.

They found newly harvested, par-fried potatoes could be kept in freezer storage at zero degrees Fahrenheit for up to nine months "and be as tasty and tender as freshly prepared French fries."

Science News Letter, September 1, 1956

GENERAL SCIENCE

See Help for Disabled Workers in Automation

➤ AUTOMATION may prove a boon to workers so disabled they cannot operate heavy machinery or perform other jobs requiring physical strength.

Their technical ability, however, might be developed so that they could operate increasingly complex machinery that required little or no physical strength.

Research on the problem will be undertaken by the Human Resources Corporation of New York with the aid of a $60,313 grant from the U. S. Office of Vocational Rehabilitation.

Blind farmers, both farm owners and tenants, will be rehabilitated, along with their farms, in another Federally-aided program sponsored by the Alabama Institute for the Deaf and Blind.

In California still another Federally-aided rehabilitation project calls for establishment of a half-way house to give a home to men discharged from the state mental hospital and who are gradually returning to work situations. The half-way house is expected to help them make the change from the hospital to normal living again.

Grants totalling $540,923 for 19 such research and demonstration projects in rehabilitation were awarded.

Science News Letter, September 1, 1956

Books of the Week

For the editorial information of our readers, books received for review since last week's issue are listed. For convenient purchase of any U. S. book in print, send a remittance to cover retail price (postage will be paid) to Book Department, Science Service, 1719 N Street, N.W., Washington 6, D. C. Request free publications direct from publisher, not from Science Service.

CLOUDS, RINGS AND CROCODILES: By Spaceship Round the Planets—H. Percy Wilkins—*Little, Brown,* 148 p., illus. by drawings by Anne Marie Jauss, $3.00. A British astronomer takes us on an imaginary trip in space and tells us much that is known of the planets and stars. He speculates that Venus has plant and animal life like that on earth during the age of reptiles.

EXPERIMENTAL PHYSICAL CHEMISTRY — Farrington Daniels and others—*McGraw-Hill,* 5th ed., 482 p., illus., $6.50. Intended to train in careful experimentation and to encourage ability in research.

GERMAN-ENGLISH MATHEMATICAL VOCABULARY —Sheila Macintyre and Edith Witte with grammatical sketch by Lilias W. Brebner—*Oliver and Boyd (Interscience)* 95 p., $1.55. This small volume should enable the reader to understand most mathematical texts in German. It will also serve the more advanced linguist as a compact book of reference.

HAY FEVER AND WHAT YOU CAN DO ABOUT IT—Samuel M. Feinberg and others—*American Foundation for Allergic Diseases,* 16 p., illus., paper, 25 cents ordered direct from publisher, 274 Madison Ave., New York 16, N. Y. One in every 20 Americans are battling this allergy. The booklet includes an up-to-date ragweed pollen index.

HOW TO BECOME A RADIO AMATEUR—*American Radio Relay League,* 15th ed., 108 p., illus., paper, 50 cents, plus postage. Information on how to build a radio receiver and a transmitter and how to get a license. There is also a chapter on the fundamentals of radio.

THE LITTLE OXFORD ATLAS—*Oxford University Press,* 60 p., illus., $1.55. Maps printed in the "photo-relief technique," having a striking three-dimensional effect.

MANAGEMENT OF EMOTIONAL PROBLEMS IN MEDICAL PRACTICE—Samuel Liebman, Ed.—*Lippincott,* 152 p., $5.00. Nine physicians contribute to this book directed to the general practitioner and advising on what to do to handle emotional problems and psychiatric emergencies that may arise among his patients. Such conditions as suicidal threats or attempts, violence, depression and anxiety are discussed.

MAN'S ROLE IN CHANGING THE FACE OF THE EARTH—William L. Thomas, Jr., Ed.—*University of Chicago Press* for the *Wenner-Gren Foundation for Anthropological Research* and the *National Science Foundation,* 1193 p., illus., $12.50. Summarizing man's exploration and exploitation of his planet and anticipating what may occur in the future. It is pointed out that uranium may be simply recovered from granite with an energy gain equivalent to 25 tons of coal for every ton of granite processed.

PLANNING AND MANAGEMENT OF ROADSIDE VEGETATION: An Analysis of Principles—*Highway Research Board,* Special Report 23, 48 p., illus., paper, $1.05. The principles presented are applicable to all kinds of highways, including parkways and arterial routes, both old and new and in all kinds of situations.

THE POTENTIALS ABOUT A POINT ELECTRODE AND APPARENT RESISTIVITY CURVES FOR A TWO-, THREE-, AND FOUR-LAYERED EARTH—Harold M. Mooney and W. W. Wetzel—*University of Minnesota Press,* 146 p., text $4.50, set of curves $15.00, text with curves $18.00. By the electrical resistivity method it is sometimes possible to obtain information about what lies under the earth's surface without drilling.

SMALL ARMS AND AMMUNITION IN THE UNITED STATES SERVICE—Berkeley R. Lewis—*Smithsonian,* Miscellaneous Collections, Volume 129, 338 p., illus., $8.00. A history of the development of weapons from the muskets of the first colonists.

A STUDY OF THE ULTIMATE STRENGTH OF COAL AS RELATED TO THE ABSOLUTE SIZE OF THE CUBICAL SPECIMENS TESTED—Frank L. Gaddy—*Virginia Polytechnic Institute,* Bulletin, Engineering Experiment Station Series No. 112, 27 p., illus., paper, 25 cents. Reporting the relation between the strength of a three-inch cube of coal and that of a mine pillar. Throwing light on conditions likely to result in disastrous cave-ins.

TELEVISION SERVICING — Matthew Mandl — *Macmillan,* rev. ed., 460 p., illus., $6.50. Intended as a textbook for technical schools and vocational high schools.

Science News Letter, September 1, 1956

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TECHNOLOGY

Westinghouse Dedicates Electrical Laboratories

➤ THE most modern research laboratories in the electrical industry will be dedicated in Pittsburgh, Pa., this month by the Westinghouse Electric Corporation.

Plans for the dedication, which will begin on Sept. 12 and 13 with a press preview, were announced by Dr. J. A. Hutcheson, vice-president in charge of engineering.

The new laboratories will be staffed by more than 700 research workers engaged in both basic and applied scientific studies. At the dedication, Westinghouse scientists will take the wraps off several research projects and developments now underway at the laboratories.

Science News Letter, September 1, 1956

BIOCHEMISTRY

Radioactive Wastes Cleaned by Tiny Animals

➤ MILLIONS of minute plants and animals can be used to clean the world's waterways of dangerous radioactive wastes.

Experiments showing that certain microscopic marine organisms extract fission products from the water in which they live are described by three Japanese scientists in *Science* (Aug. 17).

The scientists explain the use of the living cleaners in this way.

A tiny marine organism known as *Aphanocapsa koordersii* has been found in the laboratory to be able to remove radioactive particles from the water and store them in its body. A second tiny sea animal called *Brachionus plicatlis* feeds on *Aphanocapsa* and, when it does, it absorbs not only the *Aphanocapsa's* radioactive stockpile, but similarly, that of the surrounding water too.

Based on their experiments, the scientists say these two organisms could be transplanted into contaminated waterways and clean them up.

They point out that other minute marine life around Bikini Atoll in 1954 were found to have contained 1,000 times more radioactivity than the water in which they lived.

The scientists making the report are Drs. Giichi Yoshii, Norimitsu Watabe and Yaichiro Okada of the Prefectural University of Mie, Japan.

Science News Letter, September 1, 1956

BIOLOGY

Tiny Organism Helps Drug Resistance Research

➤ HOW CERTAIN ORGANISMS develop a resistance to drugs may be learned from a tiny animal with a taste for salts and alcohol.

The tiny animal is the *Chilomonas,* a microscopic organism, the subject of drug experiments by Dr. Richard P. Hall of New York University, visiting professor of zoology at the University of California at Los Angeles this summer.

The *Chilomonas* normally uses as its food source acetic acid and various salts, Dr. Hall said. However, it can also thrive on alcohol if it does not overindulge.

Dr. Hall is interested in learning how the organism develops resistance to sulfa drugs. Initially, the *Chilomonas* is overwhelmed by the drug, but succeeding generations develop a resistance that enables them to carry on normally in the drug's presence. The resistance is apparently the result of certain chemical changes in the organism's life processes.

The *Chilomonas* is not a disease-causing organism, Dr. Hall noted, but if the chemistry by which it becomes resistant to sulfa drugs can be determined, it may help scientists understand how disease organisms develop drug resistance, although the processes may not necessarily be the same.

Science News Letter, September 1, 1956

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BIOCHEMISTRY

Anti-Cancer Chemicals

Synthesis of riboside allows testing this chemical against bacteria and leukemias resistant to 6-mercaptopurine, which stops cancer temporarily.

➤ A BREAKTHROUGH in the chemical fight on cancer and leukemia may come very soon.

Experiments designed to answer an important question about anti-cancer chemicals are expected to be finished in the immediate future. The answer may, however, be a negative one, leaving cancer fighters no farther ahead than they are now.

The experiments are being made with a chemical called 6-mercaptopurine riboside. This chemical was created by Dr. James A. Johnson Jr. and Miss H. Jeanette Thomas in the Kettering-Meyer Laboratory of the Southern Research Institute at Birmingham, Ala.

Anti-cancer, anti-bacterial and anti-leukemia activity for 6-mercaptopurine has been known for several years. Unfortunately, resistance to the chemical develops, so that after a time cancer and leukemia patients are no longer helped by it.

How it acts to stop cancer even temporarily has not been well understood. It might be that the drug must be converted in the body to a riboside or a ribotide before it becomes effective.

Now that a way to make the riboside in fairly good quantities has been found, it is being tested against bacteria and leukemias resistant to 6-mercaptopurine.

Tests have already shown that the riboside is as effective as 6-mercaptopurine against animal cancers. The scientists were disappointed that it was not more effective.

If it proves effective against resistant leukemias, however, it might give doctors another chemical weapon to use in treating patients. And it would suggest that 6-mercaptopurine has to be converted to the riboside to be effective and that resistance develops to the 6-mercaptopurine because the body cannot continue converting this to the riboside.

The testing of the riboside is now being done by F. M. Schabel Jr. and H. E. Skipper of the Kettering-Meyer Laboratory in Birmingham. Synthesis of the riboside is reported by Dr. Johnson and Miss Thomas in the *Journal of the American Chemical Society* (Aug. 5).

Science News Letter, September 1, 1956

YOUR HAIR and Its Care

By Oscar L. Levin, M.D. and Howard T. Behrman, M.D.

If you want healthy hair, lovely hair, then you need the expert advice in this book.

Two medical specialists have here pooled their knowledge to give you in plain language the up-to-date scientific facts now available about hair. They tell you what to do (and what not!) to save and beautify your hair, stimulate healthier hair growth, and deal with many problems, common and uncommon, as: Dandruff—gray hair—thinning hair—care of the scalp—baldness—abnormal types of hair—excessive oiliness—brittle dryness—hair falling out—infection—parasites—hair hygiene, etc., etc.

Medical science is better equipped today than ever before to prevent trouble above the hair line; or, should some difficulty already have arisen, to deal effectively with it.

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PUBLIC HEALTH

Grants Total $750,000 For Medical Reactor

➤ GRANTS totalling $750,000 have been awarded to the Massachusetts Institute of Technology, Cambridge, Mass., for a unique atomic reactor primarily designed for medical treatment and research.

The reactor, now under construction, will be the first and only atomic tool of its kind in the country with a downward-directed beam of nuclear rays. This means that the medical and biological facilities will be centered in a therapy room, located underground directly beneath the reactor itself.

Designed to serve all medical organizations in Greater Boston, the therapy room itself will be a large and completely equipped operating room. Thus, irradiation of patients immediately after surgery will be possible.

The medical treatment and research that will be available to New England scientists when the reactor is completed include:

1. Neutrons or gamma rays from the reactor may be used directly to irradiate tumors in patients brought to the medical therapy room.

2. Basic studies of the effects of neutrons or gamma rays on living tissues will be possible.

3. Neutron-produced short-lived isotopes, never before available in New England, can be produced.

The grants to M.I.T. were made by the National Science Foundation, $500,000, and the Rockefeller Foundation, $250,000. The cost of the reactor will be at least $2,000,000.

An immediate use of the medical facilities will be a new treatment for cancer of the brain, developed by Dr. William H. Sweet of the Massachusetts General Hospital, Dr. Gordon Brownell, also of Massachusetts General and assistant professor of nuclear engineering at M.I.T., and Dr. Lee Farr of the Brookhaven National Laboratory, Upton, N. Y.

Science News Letter, September 1, 1956

Do You Know?

In 1955, 38,000,000 passengers were carried on U. S. *airlines.*

Alcoholism is said to be second only to war as a destroyer of human life.

The 200,000,000 bushels of *grain* rats destroy each year would make 12,500,000,000 loaves of bread, or 317 loaves for each household in the U. S.

About nine out of ten forest *fires* are caused by man.

On Aug. 2, 1946, the first shipment of reactor-made *radioisotopes* was sent out from Oak Ridge.

Today, over half the *physicists* in the United States are employed by private industry.

Children have more *colds* than adults.

INVENTION

Colored Radar Helps Pick Out Ships in Heavy Seas

➤ A COLORED RADAR system that makes it easier for the radar operator to pick out a ship on his screen during heavy seas has been invented.

The invention may help prevent future ship collisions, such as the recent maritime disaster involving the Italian ship Andrea Doria and the Swedish motorboat Stockholm. Its improvement over conventional radar sets is that the new system employs a color identification process for picking out targets from the surrounding environment.

The system's inventor, David E. Sunstein of Cynwyd, Pa., points out that all too often it is hard for a radar operator to get a clear and sharp picture. This is particularly true, he says, in choppy seas where a ship appears on the screen to blend in with the water. In these cases, Mr. Sunstein says, the operator often readjusts his set without remedying the situation.

The colored radar system employs the principle that signals reflected from a target such as a ship or building are ordinarily of greater amplitude than those reflected from land masses or the sea. Mr. Sunstein has the signals passed through a cathode ray tube having a fluorescent screen that, under electron bombardment, emits light of a preselected color. The signals are then passed through a second screen.

What the operator then sees on his radar screen is the target in one color and the surrounding environment in another color. Mr. Sunstein says that color filters can also be used. The colored radar received patent No. 2,758,298. Mr. Sunstein assigned the patent rights to the Philco Corporation of Philadelphia.

Science News Letter, September 1, 1956

PUBLIC HEALTH

Premarital Blood Test

Many venereal disease experts are questioning the value of required premarital blood tests, charging cost is exorbitant considering the few cases found.

➤ THE VALUE of the compulsory premarital blood test for syphilis, greatly stressed two decades ago, is now being questioned by a number of venereal disease experts in state and city health departments.

At the time when the battle against venereal diseases was being vigorously fought, premarital blood tests were considered important for finding unsuspected cases of the disease and getting the infected persons treated before the disease could be passed on to the next generation.

All but the following nine states now have the compulsory premarital blood test: Maryland, District of Columbia, South Carolina, Mississippi, Minnesota, Arizona, Nevada, New Mexico and Washington.

The compulsory premarital blood test, however, is now seen costing more than it is worth.

The reason is that so few cases of syphilis are discovered through it that were not already known to health authorities from clinic activities and reports of physicians. Even these small numbers of previously unknown cases are rapidly growing fewer.

The cost of discovering cases through compulsory premarital blood tests has been put at from $2,741 per case in California to $30,000 per case in upstate New York. This is assuming only the usual hospital laboratory charge of $3 for the blood test and adding nothing for the physician's fee, which usually must be paid.

Reason for the high cost is that as many as 10,000 tests may be made for every case found.

At a meeting of State Laboratory Directors, Dr. Henry Bauer of the Minnesota Department of Health urged more selective use of blood tests instead of routine testing of many population groups, such as persons applying for marriage licenses, food handlers for employment and all patients admitted to hospitals.

A study of tests made in his state showed that most of the cases found were in population groups over age 40, although almost half the testing was being done in groups under age 34.

He urged laboratories to evaluate continuously their entire program and be prepared to drop parts that have served their purpose so as to "make way for more productive utilization of funds and personnel."

Agreeing with Dr. Bauer is Dr. A. W. Hedrich of the Maryland Department of Health, where compulsory premarital blood testing has been opposed by state and city health departments, universities and medical societies.

One of the arguments these authorities have used is that, in addition to the small numbers of syphilis cases such premarital tests show, a good number of false positive results are given by the usual tests on blood of nonsyphilitics.

Besides the unhappiness this causes, the false positive results call for more tests and more conclusive ones with more skilled interpretation of the results.

Dr. Hedrich pointed out, however, that "overnight action" is not to be expected, although many health authorities are now not in favor of the compulsory premarital blood tests.

Science News Letter, September 1, 1956

RADIO ASTRONOMY

Twinkling Radio "Stars" Caused by Ionosphere

➤ THE TWINKLING of radio "stars," similar to the twinkling of visible stars but at radio wavelengths, is caused by two different layers in the ionosphere.

One, known as sporadic E, is the source of daytime scintillations; the other, called spread F, causes the nighttime scintillations. Drs. J. P. Wild and J. A. Roberts of the Commonwealth Scientific and Industrial Research Organization, Sydney, Australia, report in *Nature* (Aug. 18) that the probability their findings are due to chance alone is one in 1,000 or less.

The nighttime observations of scintillation patterns show they drift from west to east across the ground at about 270 feet per second. This motion, Drs. Wild and Roberts say, would result from the earth's rotation if the irregularities in the atmosphere causing the scintillations were located about 300 miles above the surface.

Science News Letter, September 1, 1956

Questions

ASTRONOMY—What may cause the radio waves from heavenly sources? p. 131.

□ □ □

ENTOMOLOGY—On what should all fly control methods be based? p. 132.

□ □ □

GENERAL SCIENCE—How much equipment is needed for small game hunting? p. 138.

□ □ □

GEOGRAPHY—How high is Mount Rainier? p. 135.

□ □ □

NATURAL RESOURCES—What is Mission 66? p. 137.

□ □ □

PSYCHOLOGY—What factor influences how much a wound hurts? p. 136.

□ □ □

TECHNOLOGY—What are gage blocks? p. 133.

How does a rectangular sail change a boat's performance? p. 137.

□ □ □

Photographs: Cover, pp. 138 and 139, Fremont Davis; p. 131, National Carbon Company; p. 133, National Bureau of Standards; p. 135, Bell Aircraft Corporation; p. 143, Eastman Chemical Products, Inc.

BIOCHEMISTRY

Vaccine Brings Cancer Resistance in Mice

➤ WHOOPING COUGH VACCINE makes mice somewhat more resistant to transplanted cancer, although it does not cure the cancer.

The same vaccine, on the other hand, makes the mice more susceptible to various infections, including influenza.

The findings suggest that the two kinds of resistance may result from different mechanisms.

The mouse experiments, by Drs. Ivan A. Parfentjev and E. E. Manuelidis of Yale University, were announced by the American Cancer Society which, with the National Cancer Institute, has been supporting the research.

Science News Letter, September 1, 1956

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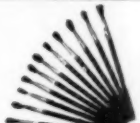

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CUTTING KNIFE features a light balanced handle made of butyrate plastic, and surgical-steel blades. Designed for hobbyists, artists, photographers and craftsmen, the knife has a patented chuck that keeps the blade locked to the handle.

Science News Letter, September 1, 1956

SLIDING DOOR CABINET can hold office supplies, books, magazines, tax records or medical supplies. The sliding doors runs smoothly on over-head nylon rollers. Made of heavy gauge steel, the cabinet has one welded shelf and two movable shelves. It measures 36 by 22 by 68 inches.

Science News Letter, September 1, 1956

SOFTER SCISSORS GRIP features a new line of scissors in various sizes. The effect is obtained by coating the handles with a foamed plastisol based on a vinyl resin. Soft and resilient, but not slippery, the coating adheres firmly to the forged steel, easing tough cutting jobs. The coated-handled scissors are available in blue, yellow, green and red.

Science News Letter, September 1, 1956

TOY BUG gives the impression it actually thinks. Powered by flashlight batteries, the big bug, shown in the photograph, moves along steadily, turns right or left or goes around in a circle. Whisker-like antennae of steel wire activate the steering mechanism. The bug's body is made of an orange acetate plastic.

Science News Letter, September 1, 1956

GRAPHITE GUN small enough to be hand-held sprays the dry lubricant at its target while held in any position. A rubber bulb is attached to the container to provide a fine spray. The unit contains graphite for several thousand "shots."

Science News Letter, September 1, 1956

EMERGENCY CHART for the laboratory is a comprehensive, alphabetical compilation of emergency treatments for burns, scalds, cuts, electrical shock and collapse. It includes an A-to-Z listing of treatments for specific poisons. Measuring 18 by 27 inches, the chart has metal edges at top and bottom. It is printed on a fiber-and-plastic material.

Science News Letter, September 1, 1956

PORTABLE PHOTO COPIER is an all-metal, self-contained machine that does all the necessary operations such as exposure and processing. Operating under all normal office lighting conditions, the photo copy machine reproduces from all colors and makes one- or two-sided copies. Multiple copies up to seven can be made from one negative.

Science News Letter, September 1, 1956

SPORTS GAME for young baseball and football fans will also amuse adult sports enthusiasts. Players throw feathered rubber suction darts at a three-dimensional target that whirls when struck. The board has a baseball diamond on one side and a football field on the other.

Science News Letter, September 1, 1956

Nature Ramblings

By HORACE LOFTIN

➤ MANY WILD BIRDS and mammals lose their fear of man when they are not molested, and thus the squirrels and song birds living in many human communities become almost tame.

Although their human "enemies" may not trouble them any more, these wild creatures must not relax their guard for long. Other enemies are always about.

In one small city where animals are protected by its citizens, two squirrels were seen racing blindly round and round the base of a great oak. In this merry chase, they were making a great deal of noise, and seemed to have abandoned all caution.

Meanwhile, a lithe, white cat was working her way in short spurts of movement toward the heedless squirrels. The cat stopped a few feet from the tree trunk, just out of striking distance of the squirrels. Her tail twitched excitedly to and fro. Every muscle seemed strained.

Nature's Sentinel

The squirrels ceased playing, and one of them perched still on the ground to eat a nut. The cat prepared to leap.

Just at that moment, however, a loud "squawking" began in a lower limb of the tree. Both squirrels suddenly shot up the tree trunk to safety while the cat, frustration written on her face, peered up into the branches.

There sat a blue jay, who began an even more insistent fussing at the cat. As if he could stand it no longer, the jay then took to the air and dive-bombed the cat, striking out with his big, sharp bill. The cat raised an ineffectual paw, but by then the jay had retreated to safety.

Soon, other jays flew to the tree, attracted by the alarm call of the first jay, and they joined in the chorus and the attack. From their safe branch, the squirrels ignored the whole proceeding now, settling down for a mid-afternoon nap. Then the villain of the piece was seen to slink away from the scene of his defeat, uttering a pitiful "meow."

Even when animals move from the "wilds" of the forest to the "safety" of the town, they must keep their alertness or post a guard. In the pugnacious jay, nature has provided a sentinel against predators which has saved many small lives.

Science News Letter, September 1, 1956